Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of	)	
	)	
Review of the Commission's Rule	)	
Regarding the Pricing of Unbundled	)	
Network Elements and the	)	WC Docket No. 03-173
Resale of Service by Incumbent	)	
Local Exchange Carriers	)	

DECLARATION OF MICHAEL D. PELCOVITS ON BEHALF OF MCI

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I. Statement of Qualifications

My name is Michael D. Pelcovits. I am a principal with the economic consulting firm of Microeconomic Consulting Associates (MiCRA). My business address is 1155 Connecticut Avenue, N.W., Washington, D.C. 20036. I received my Ph.D. in Economics from the Massachusetts Institute of Technology in 1976. After serving on the economics faculty of the University of Maryland and as a Senior Economist at the Civil Aeronautics Board, I have spent my entire career specializing in the economics of regulation and competition in the telecommunications industry.

From 1979 to 1981, I was a Senior Economist at the Federal Communications Commission, Office of Plans and Policy. From 1981 to 1988, I was a founding member and principal of the consulting firm Cornell, Pelcovits and Brenner. In 1988 I joined MCI Communications Corporation and remained with the Company following its merger with WorldCom, until 2002. During my tenure at MCI, I held positions of increased responsibility, and was appointed Vice President and Chief Economist of the Corporation. In this position I was responsible for the economic analyses of policy and regulatory matters provided and presented by the Corporation before federal, state, foreign, and international government agencies, legislative bodies, and courts.

I have written a number of professional publications on economic and regulatory issues. I have also appeared and spoken frequently before government bodies, regulatory, industry, and academic forums. I have also testified over thirty times before state regulatory commissions.

Since joining MiCRA in October 2002, I have filed several declarations at the FCC and testified before the Connecticut Department of Public Utilities and the Pennsylvania Public Utilities Commission.

II. Introduction and Summary

This declaration will address the economic issues raised in the FCC's Notice of Proposed Rulemaking Regarding the Pricing of Unbundled Network Elements (hereafter, "NPRM").[1] This NPRM begins the "first comprehensive review of the rules applicable to the pricing of unbundled network elements (UNEs)" (NPRM, ¶1) and raises a host of issues concerning conceptual and practical aspects of total element long run incremental cost (TELRIC) pricing. From a conceptual standpoint, the Commission seems most concerned that TELRIC is excessively hypothetical (NPRM, ¶7), primarily because it imposes "unrealistic efficiency assumptions" (NPRM, ¶5) that a real-world firm could never achieve. From a practical standpoint, the Commission raises the concerns that TELRIC proceedings can become a "black box" based upon "speculation" about the assumptions in the models (NPRM, ¶7, ¶60).

I will demonstrate in this declaration that the concerns raised in the NPRM are not well founded. The conceptual foundations of TELRIC are as solid and economically sensible as they were when the Commission first adopted them in its 1996 *Local Competition Order*.[2] TELRIC-

[1] *In the Matter of Review of the Commission's Rules Regarding the Pricing of Unbundled Network Elements and the Resale of Service by Incumbent Local Exchange Carriers,* WC Docket No. 03-173, Notice of Proposed Rulemaking September 15, 2003.
[2] *In re Implementation of the Local Competition Provisions of the Telecommunications Act of 1996*, 11 F.C.C.R. 15499 (1996).

based pricing of UNEs provides the right incentives and signals for both incumbents and new entrants in the local telecommunications markets.

The TELRIC methodology adopted by the FCC in 1996 was the result of a comprehensive and careful analysis of costing and pricing principles to be applied following the opening of local telecommunications markets to competition. TELRIC balances many disparate goals of the Commission in applying the Telecommunications Act of 1996. TELRIC is aimed at sending the right price signals to incumbents and competitors. Incumbent local exchange carriers (ILECs) are to be paid for use of their network based upon forward-looking cost. Entrants are to be given the right incentive to buy or build facilities depending upon which is economically more efficient. TELRIC is not intended to benefit any party or to favor one type of competition over another, but rather to encourage socially efficient competition that provides long-term and lasting benefits to consumers. Since the FCC's ruling in 1996, state regulatory commissions have devoted significant resources to implementing the TELRIC rules in a fair and balanced manner. The Commission's endorsement of TELRIC has also received strong legal affirmation from the Supreme Court.

Most states have implemented TELRIC in an open and transparent manner. This stands in stark contrast to the costing and ratemaking practices of the past when the incumbent ILECs maintained complete control over the cost models introduced in state proceedings. Based on over twenty years' involvement in costing issues at the state level, I believe that the costing process since the introduction of TELRIC has been far superior to any previous time when the cost of particular services provisioned over the "actual" network was modeled by the ILECs. For example, prior to the introduction of TELRIC studies, the ILECs' claimed that there were cost differences between Centrex loops and the loops used for other services. In-depth analysis of these cost studies by state commissions and intervenors revealed that the loops used were identical and that the service class distinctions were artificially drawn.

My declaration will address the conceptual and practical aspects of TELRIC costing. In the next section, Section III, I discuss why TELRIC, as conceived and implemented since 1996, is the proper standard for achieving the objectives of the Telecommunications Act of 1996. In Section IV, I explain how the assumption of TELRIC that the most efficient technology be used is fully consistent with the way in which competitive markets operate. In Section V, I discuss the dangers associated with extensive and indiscriminate reliance on the traditional models of the "actual" network, prepared and provided by the ILECs. In Section VI, I explain how a false dichotomy has been drawn between modeling based on "hypothetical" versus "actual" networks. In fact, the state regulatory commissions, which have been charged with the implementation of TELRIC, have relied extensively on information about the "real world" and the ILECs' actual networks, although they have not taken the ILECs' word as gospel. Rather, the state commissions have used engineering-economic modeling of efficient networks along with information and data on the ILECs' network to establish prices. The state commissions' use of an efficient-network standard has been an important part of getting the job right and not surrendering the costing process to the ILECs' control. I also explain how the state commissions have kept the costing process open and how they have used the information provided by the ILECs on their actual network to develop UNE prices. In Section VII, I discuss whether UNE pricing should be modified on account of the limitations to the unbundling requirements included in the Triennial Review Order ("TRO").[3] Finally, in Section VIII, I address whether incentive regulation has given the ILECs the incentive to operate as efficiently as competitive firms, thereby justifying use of their actual cost as a pricing standard.

I conclude that the TELRIC experience has been successful. TELRIC should not be abandoned or materially changed to the extent that the competitive local exchange carriers (CLECs) are given access to the new network facilities that the ILECs are now building. To the extent that the CLECs are restricted to using the old narrowband, circuit switched network, however, TELRIC price levels could be excessive and lead to economic inefficiency and facilitate price squeezes by the ILECs. Under these circumstances, the long-run incremental cost of maintaining services using the old network should serve as the pricing standard. Furthermore, the range of results from different states should not be seen as a weakness of TELRIC, but rather as a necessary feature to allow states to reflect state-specific conditions.

III. TELRIC Economics

The TELRIC pricing standard accomplishes several objectives. First, it constrains the ability of the ILECs to leverage their market power in upstream monopoly markets into control

[3] *In re Review of the Section 257 Unbundling Obligation of Incumbent Local Exchange Carriers,* 18 F.C.C.R. 16978 (2003) ("TRO").

of potentially competitive downstream markets. Second, TELRIC-based pricing provides the right signal to competitors on whether they should buy or build certain network elements. In order to achieve both of these objectives with respect to the forward-looking network, it is vital to maintain the TELRIC rules adopted by the FCC in the 1996 *Local Competition Order,*[4] rather than a watered-down version of forward-looking costs based on the so-called "actual network."

TELRIC Helps to Prevent Anticompetitive Leveraging into Downstream Markets

The ILECs' bottleneck control over ubiquitous access to customer premises has not been reduced materially since passage of the 1996 Telecommunications Act (hereafter TA 96).[5] Competitors remain at the mercy of the ILECs to provide services that require the loop as an input. (These are defined as "downstream" markets in economics.) Unless regulated, the ILECs will be able to leverage their market power in the loop market (i.e., the upstream market) into these downstream markets. The provisions of TA 96 direct the FCC and the state commissions to enact and implement regulations that require the ILECs to offer network elements, such as the loop, to downstream competitors on nondiscriminatory terms at cost-based prices.

TELRIC-based pricing of UNEs is a balanced measure that can help narrow the degree of monopoly leveraging. Monopoly leveraging occurs when a monopolist that controls a key

[4] *Implementation of the Local Competition Provisions in the Telecommunications Act of 1996*, CC Docket No. 96-98, First Report and Order, 11 FCC Rcd 15499 (1996) (*Local Competition Order)*.
[5] As the Commission has noted, while competitive local exchange carriers (CLECs) serve more than 10 percent of the lines in BOC territory, 6.9 percent are served using either UNE-P or UNE-L, leaving the CLECs substantially dependent upon the ILECs to reach end user customers. See *Review of the Section 251 Unbundling Obligations of Incumbent Local Exchange Carriers, Implementation of the Local Competition Provisions in the Telecommunications Act of 1996, and Deployment of Wireline Services Offering Advanced Telecommunications Capability*, CC Docket Nos. 01-338, 96-98, and 98-147, Report and Order and Order on Remand and Further Notice of Proposed Rulemaking, FCC 03-36 (2003) (*Triennial Review Order)* at ¶41.

input overcharges its downstream competitors for use of that input, and then cuts its own retail prices in the downstream market below the sum of its cost plus the overcharge on the input. Due to its bottleneck control over essential inputs, the ILEC is well-positioned to engage in such a price squeeze in retail telecommunications markets and thereby prevent or limit entry by equally or more efficient competitors.

An ILEC derives its leverage in the downstream market because its cost for the monopoly inputs are substantially lower than the rates it charges the CLEC for those inputs. Therefore, its own marginal cost is much lower than the CLECs' marginal cost, and it has greater flexibility to reduce prices in order to retain or attract customers from the CLECs. A CLEC, of course, can reduce prices only to the level of its own marginal cost, even if those costs are artificially inflated by high UNE rates. The marketplace advantage goes to the ILEC – the firm with the lower marginal cost. If the CLEC anticipates that its marginal cost will be much higher than the ILEC, it will be reluctant to enter into the downstream market. This is not to say that market prices will always fall all the way to marginal cost. However, a large disparity in the marginal cost of firms in the same market will be very deleterious to the financial health of the higher cost firm (or firms).[6]

I will illustrate the effect of UNE pricing on the marginal cost of the CLEC and ILEC in a downstream market for broadband services by use of an example (which is shown in the table below). The example assumes that the CLEC can provide the downstream function of digital

[6] The ILEC's incentive to engage in a price squeeze may be reduced by the "opportunity cost" of lost UNE sales. In order to minimize this opportunity cost, the ILEC may engage in non-linear pricing in the downstream market, i.e., limiting price reductions only to those customers for whom the CLEC can compete.

subscriber line (DSL) service using DSLAMs, packet switches, and transport, etc. at a marginal cost of $20 per line per month (excluding the cost of the loop), while the ILEC is less efficient and can provide the same functions at a marginal cost of $22 per line per month. The marginal cost of retail DSL service for the ILEC and the CLEC also includes, however, the marginal cost to each carrier of an unbundled loop. The example assumes that the forward-looking cost of the loop is $10 per month. For the CLEC to be provided with the loop on the same terms as the ILEC self-provides it, the price for the unbundled loop should be set at its forward-looking cost. If, however, the UNE price is set above $10 per month, this will raise the CLEC's cost artificially and potentially exclude the CLEC from the DSL market. For example, if the UNE loop price is $14 a month (i.e., $4 above cost), the CLEC's total marginal cost of DSL service will be $34 per month, while the ILEC's marginal cost of DSL service will be $32 per month. In this example, the ILEC has raised the CLEC's cost of providing service to a level that will preclude the CLEC from competing, even though the CLEC is the more efficient provider of the DSL service.

Example of a Price Squeeze in the DSL Market

	CLEC	ILEC
Marginal cost of DSL function	20	22
Marginal cost of unbundled loop	14	10
Marginal cost of DSL Product	34	32

This example demonstrates the importance of setting input prices at forward-looking costs. Since marginal cost, by its very nature, is a forward-looking concept, historic or embedded cost-based rates for monopoly upstream inputs cannot protect downstream competitors from a price squeeze. When prices are set above marginal cost, a less efficient monopolist may be able to leverage its upstream market power and exclude a more efficient CLEC from the downstream market.

TELRIC-based prices do not prevent all price squeezes, however, because TELRIC is above marginal cost. There are two categories of costs – common costs and fixed costs – that are included in TELRIC, but excluded from marginal cost. The TELRIC paradigm established by the Commission in 1996, however, narrowed the gap between TELRIC and marginal cost by requiring the costing of network elements, rather than network services. This focus on network elements reduced common costs to a very small share of total cost. Furthermore, so long as the ILECs are adding to the capacity of the network that is leased by the CLECs, most costs are variable rather than fixed, which also narrows the gap between TELRIC and long-run marginal cost.[7] Therefore, at least under the conditions governing the costing of UNEs where the CLECs had access to the entire network, TELRIC provides a useful, if not iron-clad, protection against price squeezes.

[7] I have made this comparison between TELRIC and long-run marginal cost, even though there are circumstances when short-run marginal cost is relevant to the analysis. Short-run marginal cost may be lower or higher than long-run marginal cost depending upon whether the network is close to reaching full capacity.

TELRIC Sends a Correct Buy vs. Build Decision to the CLECs

The second key benefit of TELRIC is that it sends the right signal to potential entrants whether they should buy or build certain network elements that fall in an "in-between" category. These elements are neither absolute bottlenecks, nor are they easily provided on a competitive basis. As the Commission stated in the 1996 *Local Competition Order*:

> We believe that the prices that potential entrants pay for these elements should reflect forward-looking costs in order to encourage efficient levels of investment and entry. [8]

This refers to elements that the CLEC has some potential of providing on its own, at a cost that is reasonably close to the ILEC's.[9] Of course, to the extent that the *TRO's* new "impairment" standard will have the effect of denying CLECs access to UNEs except when they are essential bottleneck facilities, pricing rules no longer need to concern themselves with these price signals to the same degree – a CLEC will in no event be able to lease facilities at TELRIC rates. Thus, pricing rules in the future provide only secondary protection against uneconomic buy-build decisions by CLECs.

The arguments for using forward-looking costs are well established and discussed in the *Local Competition Order*. These arguments apply with equal or greater force under current market conditions, when local telephony technology is undergoing significant change and the CLECs have limited access to capital.[10] It is absurd to set artificially high UNE prices to provide

[8] *Local Competition Order*, ¶672.
[9] The CLEC will prefer to self-provision network elements whenever possible, to give it greater control over its offerings to customers. Thus, the CLEC might self-provision an element even if its cost of doing so is somewhat higher than buying UNEs, simply to achieve this greater control.
[10] See the discussion in Section VII on the effect of the *Triennial Review Order* on TELRIC.

an artificial incentive for CLECs to build network components when there is excess capacity and the network is undergoing substantial technological change. Thus, it is important to recognize that cost studies based on TELRIC principles can do double duty. The same costing principles and methods are equally valid for the pricing of the potentially competitive elements (e.g., switching) as they are for the tight bottleneck elements (e.g., loops). TELRIC, as elucidated in the *Local Competition Order*, should capture the concept of efficient pricing that can be and is achieved in competitive markets. This will enable efficient competitors to emerge in downstream markets, and at the same time encourage efficient investment in facilities.

This explanation should also help address a concern expressed by the Commission that there is a "key internal tension" in the current application of TELRIC, particularly "the assumption that for some purposes rates should reflect a market with widespread facilities-based competition but, for other purposes, rates should reflect a market with a single dominant carrier." (¶ 4) The Commission's concern over the "key tension" is easily disposed of – there is no logical tension or conceptual flaw in TELRIC from the standpoint of economic theory. UNE rates should reflect a normal, risk-adjusted, market rate of return to the ILECs for all network elements, including those that are subject to large economies of scale or scope. In some cases, these economies may be so large as to make it inefficient for other carriers to provide these elements on their own, in which case the competitive outcome would be a single dominant carrier. Setting prices that recognize this fact and take into account these economies of scale and scope is not inconsistent with a pricing standard based on the efficiencies and prices that would prevail in a competitive market. Quite to the contrary, this pricing standard must be imposed on the "natural monopoly" elements, so that competitors in the downstream markets will have a chance to compete against the ILEC, which has the ability and incentive to leverage its upstream monopoly.

IV. TELRIC and Changing Technology

The Commission provides insight into its concerns about TELRIC, claiming that TELRIC erroneously "purports to replicate the conditions of a competitive market by assuming that the latest technology is deployed throughout the hypothetical network." (NPRM ¶50) The Commission appears especially troubled by the assumption in TELRIC that the latest technology is deployed uniformly throughout the network when judging competitive costs: "In the real world, however, even in extremely competitive markets, firms do not instantaneously replace all of their facilities with every improvement in technology." (Id.) The Commission further notes that "...it is unlikely that any carrier, no matter how competitive the marketplace, would deploy new technology instantaneously and ubiquitously throughout its network. *Even if the objective is to replicate the results of a competitive market, an approach that reconstructs the network over time seems to be more appropriate than one that assumes the instantaneous deployment of 100 percent new technology.*" (NPRM ¶ 68, emphasis added.) The Commission asks how this tentative conclusion affects the technology assumptions used to develop UNE prices. (NPRM ¶ 69)

The Commission's tentative conclusion that it is "more appropriate" to base forward-looking costs and UNE prices on less-than-complete adoption of the most efficient technologies is unwarranted. The Commission appears to be confused over whether the purpose of TELRIC is to predict (1) the pace at which individual firms actually adopt a new technology, or (2) the timing of when market prices are constrained by the availability (even if not the complete adoption) of new technology. The purpose of TELRIC is the latter, not the former. In a competitive market, new technologies constrain prices long before they are ubiquitously adopted.[11] The appropriate standard for the pricing of UNEs should reflect this fact.

Economists advocating on behalf of the ILECs have gone to great lengths to create a straw man, sophomorically labeled TSLRIC-BS, claiming that TELRIC assumes instantaneous and complete adoption of new technology.[12] TELRIC assumes no such thing. Interestingly, the recent Lexecon paper does not go so far as to adopt this critique of TELRIC.[13] The theory behind TELRIC, and the proper implementation of this theory, does not imply that firms in a competitive market will discard old technology immediately, but rather that the value of the old technology equipment will decline commensurately, and the prices of the services provided by this equipment will decline, as a result of the emergence of a "better mousetrap."

Even though not all firms in competitive contexts adopt new technology immediately, the availability of new technology drives down prices very quickly. If new firms can enter a market easily using the new technology, then prices will be based upon the efficiencies that these entrants can realize. Conversely, if adopters of a new technology can earn supranormal profits (i.e., a higher return on investment than the cost of capital) at current prices, then the market is

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[11] See Janusz Ordover, Pricing of Network Elements at TELRIC: A Necessary Prerequisite for Local Competition, July 17, 2002, attached to WorldCom Reply Comments, CC Docket No. 01-338.
[12] See, Kahn, Tardiff and Weisman, "The Telecommunications Act at three years: an economic evaluation of its implementation by the Federal Communication Commission, Information and Policy" (1999), pp. 326-7.
[13] Lexecon, "Report of Kenneth Arrow, Gary Becker, Dennis Carlton, and Robert Solow, On Behalf of Verizon," November 18, 2003.

not in equilibrium. Either new firms will actually enter the market, or the threat of entry will force incumbent firms to lower prices. Either way, prices will drop. This effect will be the felt most strongly the more "contestable" the market, i.e., the lower the level of sunk costs that firms must incur to enter the market. This benchmark of a contestable market, or, alternatively, a competitive market in long-run equilibrium, [14] is something that the Commission had in mind when it established the TELRIC principles and it remains as valid today as it was then.[15]

That is not to say that declining costs due to technical change have no effect on TELRIC calculations. When costs are declining because of the technological change, then a competitive price path will entail higher prices in early periods, followed by lower prices later on. This can be accommodated either by adjustments in the time-path of recovery of economic depreciation or by the use of a separately calculated adjustment factor to the time path of TELRIC rates.[16] It is not necessary to abandon the competitive paradigm to accommodate the "real world" of declining costs due to new technologies, or less than instantaneous, ubiquitous adoption of the most recent technologies.

To be sure, using a TELRIC model based on a "hypothetical" firm that replaces all of its equipment immediately is not the only way to estimate forward-looking costs. A forward-

[14]We restrict attention to competitive models because the purpose of TA96 is to bring the benefits of competition to users of telecommunications services. *Verizon Communications, Inc. v. FCC,* 1535 U.S. 476, 489 (2001). The fact that some "real world" markets are not competitive is not of any interest to us, nor, we assume, to the Commission. That is, we presume that the Commission is not looking to noncompetitive "real world" markets (e.g., monopoly, dominant firm, collusive oligopoly, cartels, etc.) for possible benchmarks for how it and the state commissions ought to administer the UNE process.
[15]*Local Competition Order,* ¶738.
[16] The approach of applying a "correction factor" to the time path of TELRIC rates is discussed by Mandy and Sharkey, "Dynamic Pricing and Investment from Static Pricing Models," OSP Working Paper Series #40, September 2003.

looking cost model also in theory could be based on estimates of the costs of an "actual" firm that currently uses a mix of old and new technology. However, it would be necessary in a study of this nature to estimate accurately the economic value of all of the equipment used by the ILEC. The economic value should be based on how much the equipment would be worth in a fully competitive or contestable market. In such a market, however, the economic value of equipment would be constrained by the cost of the most efficient equipment. This "actual network" approach would require comprehensive and auditable data on the types of equipment and their actual utilization in the ILEC's network, and estimates of how the value of that equipment had been changed by advances in technology. Although it would generate equivalent cost values to the "blank-slate" TELRIC, the modeling would be much more difficult to conduct.

Many of the objections posed against TELRIC are in fact objections not to the basic TELRIC concept, but rather are objections to how TELRIC is implemented, and whether it has been implemented in an internally consistent way. Thus, debates over whether the cost of capital is too high or too low, or whether expected declines in new equipment prices have been properly represented in the amount of depreciation, the time pattern of depreciation, and/or in the useful life assumed for new equipment are all important to a proper and consistent implementation of TELRIC.[17] But because these issues can and should be resolved correctly within the TELRIC framework, they are not proper objections to TELRIC itself.

[17]See Ordover, op. cit; Baseman, Warren-Boulton and Woodward, *Depreciation and Capital Recovery Issues: A Response to Professor Hausman*, Ex Parte Filing on July 24, 1996 by MCI, CC Docket 96-98. NPRM ¶¶ 82-108.

V. The ILECS' "Real-World" Models Are No Less Subjective Than "Hypothetical-World" Models

At least as a rhetorical matter, the idea that UNE costing, while remaining forward-looking, should be more closely tied to the details of existing ILEC network architecture is a prominent theme in the TELRIC NPRM. In Paragraph 4, for example, the Commission states that it seeks "comment on an approach that bases UNE prices on a cost inquiry that is more firmly rooted in the real-world attributes of the existing network, rather than the speculative attributes of a purely hypothetical network." Elsewhere, the NPRM advocates "imposing some real-world boundaries on the UNE cost inquiry," (NPRM ¶ 48) and in fact reaches a tentative conclusion that "TELRIC rules should more closely account for the real-world attributes of the routing and topography of an incumbent's network in the development of forward-looking costs." (¶ 52).

This emphasis on "real-world" network attributes presumes that cost studies based on existing networks will encourage greater accuracy in pricing and reduce arbitrary variance among TELRIC cost results conducted under the existing TELRIC rules. But the proposed alternative to the existing methodology – studies that are derived from "real" as opposed to modeled data – is generally neither practicable nor less reliant on sampling and modeling methodologies than the current rules. Moreover, as the Commission itself recognized in the NPRM, reliance on "real" data often means turning over control of the costing process to the ILECs, because they are the only ones with information on their own network components and operations. The matter of "who controls the costing process" is a key aspect of the costing debate that is just below the surface of the arguments made by the ILECs claiming that "actual" is always better than "hypothetical." The ILECs prefer "actual" for the important reason that it puts them in the driver's seat of the costing process. Giving the ILECs control of the costing process will not lead to more accurate analysis. The ILECs are not a neutral, disinterested party, but rather, as stated ealier, have powerful incentives to manipulate costing data and methodologies to harm consumers and competitors.

To the extent that the NPRM suggests dissatisfaction with the use of modeling in TELRIC pricing, the proposed solution – acceptance of "real-world" data as prima facie evidence that TELRIC models are wrong – will do nothing to limit the use of and reliance on assumptions and hypothetical constructs. At the same time, even attempting to base rates on existing network facilities introduces a number of serious problems for which there is no compensatory improvement in accuracy or consistency. First, relying on existing network architecture compromises TELRIC's efficiency assumptions. Not only were existing networks developed in a context of radically different efficiency incentives than those assumed in the competitive market posited by TELRIC, but they were also limited by the then-existing technology. The problem with basing prices on the ILECs' inefficient cost structure is that proper pricing of the forward-looking cost of these facilities requires appropriately adjusted depreciation schedules and write-off of costs that were not reasonably incurred. If these adjustments are not made, the resulting price will send the wrong signals to the market, encourage CLECs to invest inefficiently, and repress usage of the telecommunications network.

Second, since the existing network was built to provide many different services, which had different influences on costs, it is difficult to draw conclusions about the costs of UNEs from estimates based on the existing network. Third, existing network data, as the NPRM acknowledges, threatens to generate pronounced informational asymmetries, since regulators and competitors would be limited entirely to data generated and controlled by ILECs. In terms of the imperatives of transparency and verifiability, then, this would be a significant retrogression.

Why Model?

In assessing the relative merits of so-called "hypothetical" cost models versus "actual" ILEC network data, it is important to recall why cost models are used at all in setting TELRIC prices. First of all, there is no real alternative to using a model to estimate costs. Even if the Commission were to abandon its decision in the *Local Competition Order* and mandate the use of embedded costs, there is no record of embedded costs that can easily be translated into the cost of unbundled network components. For example, the cost of outside plant facilities is recorded in a single account and includes the plant used for transport, as well as the plant used for loops. Moreover, it is absolutely essential to obtain the cost of network elements, such as the loop, on a disaggregated basis, in order to establish meaningful rates for the use of loops of different types and in different geographic areas. Since the Commission has correctly determined that UNE prices should be based on the forward-looking costs, rather than the embedded costs of the ILECs' network, cost models take on even greater importance. It is no longer acceptable to use information on actual network investments, even if it were possible to isolate the cost of those investments from the inadequate property records of the ILECs. Therefore, models must be constructed based on the engineering and economic principles that govern forward-looking investment decisions.

Any attempt to model a real world process must make some simplifying assumptions, while still trying to capture all relevant aspects of that process. Therefore, the criteria for assessing whether a model is valid cannot be that it makes no assumptions – all models must – but whether those simplifying assumptions appropriately capture some relevant aspect of reality.

The process by which UNE prices are set helps to ensure that cost models will be valid. All parties have access to the cost models, inputs and assumptions used, and can demonstrate how those factors do or do not meet the goal of the model – describing a forward-looking network, while at the same time incorporating any real-world constraints on the network.

Allegedly "real" network data is not always "real"

The Commission's tentative conclusion to introduce a closer accounting for "real-world" network structure, particularly routing and topography (¶ 52), rests upon the fundamentally mistaken presumption that all such data are retrievable in a useable form, or in a form that is free of subjective manipulation by the ILECs. In fact, precise data about actual network investments are not recorded in any fashion that would allow for their incorporation into UNE prices. Incumbent local exchange carriers have never introduced on the record in any state TELRIC proceeding, and apparently do not have, records that detail the actual routing of their networks or the element-by-element cost of installing and maintaining them. Nevertheless, TELRIC models have been improved where reliable data on topography (e.g., roads, mountains, bodies of water) are available. Nothing in TELRIC rules would preclude cost studies from incorporating such data into pricing models whenever it is available.

As discussed in more detail below, because precise data about the existing network facilities do not exist, Bell Operating Company (BOC) cost models that purport to rely on "real-world" attributes of incumbents' networks actually work by using sampling methods and modeling that are no less "hypothetical" than the fully-forward looking models employed under the current TELRIC rules, and actually introduce much more subjectivity into the costing process. Put simply, the actual facilities comprising existing networks are unknown, and the sampling methodologies used in "real-world" models simply do not provide anything resembling an accurate picture of existing network facilities.

Flaws of Existing ILEC Models

The shortcomings of any cost inquiry that purports to be based on actual network topography are illustrated by ILEC models that proceed from samples of embedded loops, such as SBC's LoopCAT and Verizon's LCAM models. The loop sample data upon which these models are based do not in fact reflect actual network topography. As a witness for SBC conceded in recent proceedings before the California Public Utilities Commission, the loop sample used by SBC does not even approximate the actual routing of SBC's "real-world" infrastructure.[18]

There are several reasons why the models based on loop sample data do not provide an accurate picture of actual network topography or facilities. First, the databases from which these data are derived (e.g., ARES and LEIS, the databases employed by SBC) contain limited information about only a limited portion of the total universe of loops in any given network. The sample data, therefore, are insufficient to recreate the actual routing and mileage of actual network of loops.

Typically, models using these sample data rely on a series of modeling assumptions in order to translate an inaccurate and partial picture of embedded loops into forward-looking network design. For example, SBC estimated its "actual" loop lengths for use in LoopCAT by assuming that the average loop length was half the maximum possible distance from a customer to a network node (typically a serving area interface) within a distribution area. Of course, this approach ignores any clustering of customers that actually exists. If the customer locations were in fact bunched around the network node, then the distribution lengths would be much shorter. More importantly, this method for determining the "actual" loop lengths of real customers does no such thing. The loop lengths that result from this approach are simply estimates, which would only coincidentally reflect actual loop lengths. This approach does not reflect SBC's actual network routing or, indeed, any routing whatsoever.

[18] See Public Utilities Commission, State of California, June 26, 2003 UNE Workshop, pp. 944-946.

This approach overlooks other essential factors as well. For example, existing rights of way and actual customer locations are ignored, even though these factors would obviously have a significant effect on loop lengths. In addition, this methodology ignores the fact that some customer locations can be directly served from feeder cable, while other customer locations require the use of distribution plant. In several states, SBC has *conceded* that there are no sources for such critical data.[19]

The basic unit of these models, then, is a hypothetical loop that serves no actual customer. The series of assumptions required to develop this model produce cost model inputs that bear absolutely no resemblance to actual network topography. The shortcomings of this approach are pointedly illustrated by loop study data filed by SBC that include loop lengths in excess of 18,000 feet on copper without repeaters, lengths at which loops simply cannot function without compromising the quality of transmission.

Other inconsistencies also arise from the use of incomplete embedded loop plant data. For example, structure mix – the amounts of aerial, buried, and underground cable – is distorted by trying to base the estimates from data on the amounts of embedded cable sheath. Since the different types of plant require different amounts of cable sheath per network mile, and are designed with different augmentation schedules,[20] neither the total network mileage nor the relevant structure mix can be determined on the basis of the length of embedded cable sheath.

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[19] See id., and Michigan UNE proceeding, SBC Response to AT&T's 4th Set of Data Requests, ATTSBC-196, 288, 412.

[20] Typically when underground cable is installed, multiple cable sheaths are placed in the conduit. Thus, for example, if two cables were placed in each conduit, this methodology would determine that there were two miles of structure when in fact there was only one mile, thereby overstating the amount of underground structure needed.

Again, any determination is at best hypothetical and, more likely, a distortion of both actual network topography and certainly of forward-looking efficient network architecture.

In the Virginia arbitration recently completed by the Wireline Competition Bureau, the use of Verizon's LCAM model was rejected on precisely the grounds that it had not submitted the loop studies that formed the basis of its estimates of the average loop length.[21] Thus, the Commission already has evidence that the ILECs lack the data on which it now proposes to rely.

These flaws in BOC cost models that proceed from loop sample data illustrate that the available data cannot generate anything like an accurate account of actual network routing and mileage, existing structure mix, and proper ratios of feeder and distribution plant. Short of a time-consuming period of surveying, the precise topography of "real-world" networks cannot be known, and to claim otherwise is simply disingenuous.

Other BOC models that purport to proceed from "real-world" data provide an equally inaccurate picture of existing network topography. Verizon's VzCost model[22], for example, uses data that are available for part of its service territories on the locations of actual distribution drop terminals and geocoded customer locations. A network is then designed to connect these customers locations to the drop terminals. Again, however, the resulting loop model does not produce actual loop routing and mileage. Given that there are countless possible routing and

[21] See Review of the Commission's Rules Regarding the Pricing of Unbundled Network Elements and the Resale of Service by Incumbent Local Exchange Carriers, WC Docket No. 03-173, FCC 03-224, released September 15, 2003 (VA Arbitration Order) at ¶ 53.

[22] Significantly, VzCost has largely replaced Verizon's LCAM model, which was based on loop sample data, further reflecting the extent to which loop sample models are methodologically unsound.

structure mix permutations, there is little likelihood of the results of this loop model coinciding with existing embedded plant.

At the same time, models that proceed as VzCost does from fixed distribution areas build a readily quantifiable inefficiency into any cost model, because embedded distribution areas are invariably technologically outdated.[23] Embedded drop terminals, or serving area interfaces (SAIs) typically assume areas covering approximately 400-600 termination points. Forward-looking technology facilitates a far greater ratio of one SAI for every 2,400 residences, meaning that the embedded plant data is fundamentally inconsistent with forward-looking principles and efficiency assumptions. Rates derived from embedded distribution areas, then, will lead to prices that do not capture the benefits of technological development.

It might be argued that, if actual SAI location data are available and reliable, then their incorporation into UNE rates is consistent with the existing adherence to existing wire centers in developing forward-looking network models. Existing wire centers represent an efficiency drag on forward-looking modeling but arguably are a necessary concession to the constraints that the "real-world" of network architecture places on the ability to develop purely forward-looking models. The possibility of treating SAI locations in the same way is, moreover, contemplated in the NPRM's seeking comments on whether to extend this exception to "scorched node" modeling to other network elements, such as remote terminal locations. (¶ 64)

[23] In fact, the Wireline Competition Bureau made this same point in its decision in the Virginia arbitration, noting that the network studies that Verizon used in that proceeding relied on network data that was at least 10 years old. See VA Arbitration Order at ¶ 171.

The wire center location exception to "scorched node" modeling is distinguishable from any further modification based on available SAI location data. First, the availability of reliable information on SAI locations appears to be the exception rather than the rule.[24] Second, there is an obvious difference between wire centers and SAI locations – what might be called the "infrastructural inertia" of existing wire centers is far greater than that of existing SAI locations. It is clearly far more difficult to replace or relocate existing wire centers, and it requires vastly more capital investment and planning. Accordingly, wire centers present a far more compelling case for limited departure from TELRIC's "scorched earth" assumptions. Finally, data about wire center locations are far more transparent and verifiable, as those locations are maintained in the Local Exchange Routing Guide, which is maintained by Telcordia and used by all carriers who route traffic over the public switched network to identify switch locations for routing their traffic. On the other hand, tying forward-looking prices to embedded distribution areas would essentially force CLECs and their customers to pay prices based on inefficient network design, a result pointedly at odds with TELRIC principles.

As a general matter, therefore, it is not possible to achieve the goal stated in the NPRM's tentative conclusion of basing network models on real-world network routing information. Existing data simply do not provide an accurate picture of any "real-world" network. Although the idea that rates will somehow be more "accurate" if more real-world data are used may seem intuitively correct, the universe of available data is not sufficient to bear this intuition out. There

[24] These data have been made available only in the former GTE territories, which contain only about 17 million of the total 158 million access lines served by the BOCs.

are simply no "real-world" data out there on network routing of which modified UNE pricing could take account.

ILEC Investment Plans Do Not Substitute for Cost Studies

In the Virginia Arbitration proceeding, Verizon presented cost studies based upon the costs that it anticipated it would incur over a three-year period. (VA Arbitration Order, ¶ 42). This approach gives the superficial impression that the cost estimates it provides, which will be based on real-world data, will avoid the abstraction and simplification of the typical TELRIC model of a hypothetical network. Hence, the inquiry by the Commission whether:

> ".. we should define the relevant network as one that incorporates upgrades planned by the incumbent LEC over some objective time horizon (e.g., three or five years), as documented for example in an incumbent LEC's actual engineering plans. Such an approach may provide an appropriate middle ground between the hypothetical assumptions required under our current rules and the replacement cost approach.." (*NPRM* ¶54)

The problem with the "five-year-plan" approach to UNE costing is that it is neither fish nor fowl. It is not, at least on a conceptual basis, an embedded cost study, because the cost estimates are based on forward looking investment. It is also not a cohesive forward-looking study, because it excludes the costs of any network component that does not have to be replaced in the next five years. As a result, UNE prices that would recover only the investment costs anticipated over five years will not provide the CLECs with the right price signals whether to buy or build specific network elements. For example, if the ILEC has a large inventory of

DSLAMs and no need to add capacity over the medium-term, it would be free to set a low price for DSL service, and possibly exclude a more efficient competitor from this market.

The ILECs are well aware that they need to recover more than the next five years of investment expenditure, and therefore these investment costs are only the first-step of a cost analysis proposed used to set UNE rates. The other steps used in a five-year-plan study introduce an enormous degree of arbitrariness into the costing process, and will likely lead to the recovery of costs greatly in excess of an economically valid measure of forward-looking costs. To demonstrate the problem, we will consider the cost of conduits and telephone poles.

First, consider the situation of an ILEC that has enough conduits in place to serve its customers over the planning period. In that case, there will be no incremental expenditure on conduits, except possibly for repairs, which may not be listed in the five-year investment plans. Does this imply that the forward-looking cost of outside plant should exclude any structure costs, where the cable and fiber runs through conduit? Or, asked a different way, will the ILECs forgo any recovery of conduit costs in their UNE rates?

I believe that the answer to both questions is no. On a pure TELRIC basis, there are no sunk costs or existing network, so there must be forward-looking costs of conduit. Even on a long-run incremental cost basis (LRIC) where the existing plant is taken as given, the conduit may well have an opportunity cost, if CLECs, utilities, or cable companies wish to use the conduit. The ILECs, of course, will seek to recover the costs of conduit from competitors that lease UNEs. Undoubtedly, they will argue for loading factors or other mark-ups to recover embedded conduit cost. This would permit recovery of embedded costs and would undermine much of the benefit of the original TELRIC rules, as it would introduce a large element of arbitrariness to the practice of costing and pricing of UNEs.

Verizon's treatment of telephone pole costs in the Virginia arbitration provides another example of the errors that can occur if cost studies are based on short-term or medium-term investment plans or expenditures. In the Virginia arbitration, Verizon submitted an estimated cost per pole of $713. To derive this cost, Verizon extracted the total year 2000 booked investment in poles and number of poles from the ARMIS data it files with the Commission, computing a per pole cost of $299.[25] Since the investment in poles represented the cost of the poles at the time they were initially installed, Verizon applied a current-to-book ratio of 2.39[26] to the $299 embedded cost of a pole to derive the cost per pole of $713.

The Bureau rightly rejected use of this estimate of the cost of poles. The embedded pole cost data in ARMIS reflect Verizon's historical purchases of poles, including a great many small or even individual replacement jobs, and thus do not reflect the economies of scale that would be expected to lead to lower per pole costs in building a network from scratch, as required in TELRIC. In fact, Verizon noted in the record of the Virginia arbitration that the average number of poles per job that is reflected in its 1999 and 2000 pole costs was less than 1.4. Thus, the

[25] Total investment in poles was obtained from ARMIS 43-02, Table B.1.B, column af, row 2411. The number of poles was obtained from ARMIS 43-08, Table I.A, column v, row 570.

[26] The current-to-book ratio was taken from the Inputs Order of the Universal Service proceeding, and was a weighted average of the current-to-book ratios reported by Ameritech, Bell Atlantic, BellSouth, GTE, and SBC. See Federal-State Joint Board on Universal Service, CC Docket No. 96-45, Tenth Report and Order, 14 FCC Rcd 20156 (1999) (Inputs Order), aff'd Qwest Corp. v. FCC, 258 F.3d 1191 (10th Cir. 2001), at ¶ 347.

embedded per pole cost is greatly inflated by the fact that a substantial part of the data reflects very small jobs that have unreasonably high installation costs.

As this example suggests, purchases and expenditures that an ILEC makes over the short term are not reliable indicators of the value of their network. Such expenditures are a function of a large set of variables, such as the ILEC's prior projections of growth, future projections of growth, economic conditions in the locality, and climate conditions. The proportion of equipment to be added in a random five year period may bear little relationship to the historic or forward-looking mix of equipment of a complete network. The equipment mix reflected in the data collected in these models reflects nothing at all about the total plant in an actual network. To be relevant at all, this data therefore has to be manipulated in some manner. And, the manner in which the data is manipulated to produce a model of an actual network introduces a level of arbitrariness into the models that is the opposite of what the Commission suggests when it indicates that these models are more closely grounded in the "real world."

Importance of Transparency and Verifiability of Models

While seeking to use embedded data will not lead to any advances in rate-setting, it will introduce a number of serious disadvantages which militate against adopting models that attempt to model actual existing networks.

First, as noted above, a number of models proposed by the BOCs, particularly loop sample data-based models, threaten seriously to distort critical UNE pricing inputs. In particular, major drivers of cost, such as structure mix and the ratio of direct-fed loops to those served by secondary distribution plant, are susceptible to miscalculation. As discussed above, modeling by SBC, for example, wholly ignores the problem of direct-fed loops, simply pricing all loops as distributed and therefore overstating loop costs.

Second, to the extent that the Commission is suspicious that reliance on cost models leads to arbitrariness, as manifest by the range of results in different states, then it should be even more concerned about the ILECs' models based upon "actual" data. Generally, the paucity of the data, and the manipulations needed to draw useful costing information from the data, will result in much more arbitrary results than a well-executed, easily reproducible TELRIC model. It is far from certain whether all ILECs even have "actual" data in a form that would be useful in modeling. Even for those that do, such as in the former GTE territories as discussed above, the data do not necessarily reflect the network routing and design that would be put in place by an efficient provider, as required by TELRIC.

Finally, the use of "real-world" data and inputs introduces profound informational asymmetries, thereby compromising the TELRIC imperatives of transparency and verifiability. Actual experience with BOC-sponsored models pointedly illustrates how serious a problem this is. Many of the databases in which plant data are stored are proprietary, meaning that only ILECs have access to both the data themselves and to any preprocessing algorithms that generate the sample data for the models. This is true of both loop sample models and others such as VzCost, Verizon's drop terminal data-based model. Because the source code for these models is proprietary, neither regulators nor CLECs have adequate opportunity to test and verify the methodologies behind the models. In some cases, ILECs have failed to document or disclose important calculations.[27] For that reason, the Commission rejected aspects of the "real-world" cost models produced by Verizon in the Virginia arbitration, including the non-recurring cost model, which was judged more difficult to analyze than the CLECs' model because of its "relative complexity" (VA Arbitration Order, ¶570) and was rejected because it did not "include the capability to examine and modify the critical assumptions and engineering principles," because it was "difficult to discover what they [the engineering principles] are. Indeed, Verizon provides little explanation of what many of its non-recurring activities actually involve, why they exist, or when they are necessary." (*Id.* ¶577).

Because neither the databases nor the modeling algorithms are transparent and verifiable, their use in TELRIC pricing is highly inappropriate. The NPRM specifically invites comment on the extent to which "a regime focused more closely on the existing network of an incumbent LEC would be easier for a state commission to implement." (NPRM ¶ 60). State commissions frequently adopt proposed models with modified inputs, precisely because the parties and the commissions are able to work with and test the methodologies and data presented. With models relying solely on self-reported ILEC data, this possibility would be limited. Because one of the concerns reflected in the NPRM is the apparent complexity of TELRIC pricing, the introduction of cost inquiries that are largely opaque seems counter-productive.

[27] For example, on reviewing the Verizon Cost (VCOST) model filed by Verizon in several eastern states, the CLECs uncovered several "behind the scenes" calculations that Verizon had failed to document, including applications of productivity in the development of the Annual Cost Factors in that model.

Perhaps more importantly, as the NPRM recognizes, current TELRIC rules allow ILECs and CLECs to participate on an equal footing. Reliance on ILEC-controlled data, by contrast, "could give the incumbent a significant advantage in a rate proceeding," since it would effectively control the relevant data. (¶ 60). Because the use of "actual" data offers no improvements on current TELRIC pricing, and actually exacerbates many of the concerns raised in the NPRM with "hypothetical" networks, there is nothing to justify this informational disadvantage. With neither fully informed contributions from CLECs nor the ability to test ILEC-sponsored cost inquiries themselves, state commissions will be operating without sufficient information to generate appropriate forward-looking UNE rates.

VI. TELRIC Proceedings in the States Allow Full and Complete Consideration of Data on Real World Conditions in an Open and Balanced Manner

The Commission expresses concern that because TELRIC is excessively hypothetical, TELRIC proceedings may become a "black box" from which a broad range of rates may result. Additionally, the Commission expresses concern that the TELRIC proceedings are lengthy and require the expenditure of extensive state and company resources.

These concerns are not well founded. The network that TELRIC models is "hypothetical" in that it assumes efficiently deployed up-to-date equipment, and eschews reliance on the in-place equipment, network plant used to provide unregulated activities, pension obligations, and corporate overhead of the ILECs. This "actual" data reflects the embedded costs of the ILECs, and, as shown previously, to manipulate this data to reflect forward-looking costs would truly result in a "black box," a model that is far more complex and unreliable than that required by TELRIC.

In other respects, however, TELRIC models are populated with voluminous "real world" data. To the greatest extent practicable, TELRIC models incorporate objective facts about the world, such as: customer locations, demand for telephone services by different customers, the capabilities of various network components, and topography. Many states utilize information about actual network architecture and engineering criteria in the course of their costing proceedings. Information on actual customer locations and road networks is generally used whenever it is available. In almost every respect, in TELRIC models the critical inputs that actually determine the rate are derived from real world, verifiable information about population, demand, and network capabilities.

The proceedings to set TELRIC prices in the states are very open, with ample opportunity for all parties to present cost models and evidence on the value of the inputs to those models. In many cases, the inputs selected by the state commissions for use in cost models are taken from or measured relative to information on the operations and practices of the ILECs' actual networks. This is not to say that the information provided by the ILECs is accepted without question by the state commissions. Indeed, under current FCC rules, the states do not give the benefit of the doubt to ILECs or CLECs, or to any specific cost model. Rather, the states review cost models and costing information provided by each party. The engineering-economic models presented by the CLECs often are challenged with information provided by the ILECs based on their actual networks and operations. To the extent that the models' engineering assumptions are not realistic or obtainable using current technology, the state commissions will generally reject those assumptions in favor of "actual" data provided by the ILECs.

Over the time in which the states have reviewed UNE cases, they have developed a growing expertise in the issues that affect the cost of UNEs. This section examines a recent state commission decision to explain the process by which the states have actually set UNE prices, and shows that the process produces rates that are based on an open public record, which reflects an appropriate combination of forward-looking economic models along with information and inputs based upon "real-world" aspects of the ILECs' networks. The allegedly "hypothetical" modeling that is used to set UNE rates reflects a reasonable and sometimes overly conservative reliance on several "actual" aspects of the ILECs' existing networks.

Modeling of Loop Plant Can Be Based on Actual Data

The cost models generally used in the states to set UNE rates have developed in sophistication and granularity since the Commission initially adopted its UNE pricing rules. The models have evolved over time to incorporate additional relevant real-world factors that actually affect costs. In addition to using existing ILEC central offices for the switch locations, some ILECs have developed cost models that explicitly use data on the road network to provide the routes for local loop plant. This is not to say that the ILECs use actual data on the type and variety of loop plant in place. As I mentioned earlier, they do not have this type of data available. The closest to "real" that they can come is the data on customer locations and road networks.

In a recent decision released by the Georgia Public Service Commission (hereinafter GA PSC) regarding UNE prices,[28] the GA PSC adopted the BellSouth Telecommunications Loop Model (BSTLM) to set UNE loop rates. This is a cost model developed for BellSouth that incorporates information on: geocoded customer and switch locations;[29] the specific services actually purchased at each customer location; and, the road networks in place, along which the model places loop plant to reach those customers. The BSTLM determines how much loop plant must be placed using a minimum spanning road tree algorithm to determine the shortest route along the existing roads to connect customers and switches. This algorithm determines the minimum amount of plant required to connect points in a network by starting at the switch, determining the closest network node (customer location or remote terminal that is the shortest distance from the switch) and building plant to that point, then finding the network node closest to that point, and so on, until all points that the network must reach are connected.

Like previous models, such as the HAI Model, which CLECS have sponsored in several UNE cases, and the Synthesis Model adopted by the Commission for setting universal service payments for non-rural carriers, the BSTLM used a minimum spanning tree to lay out loop plant. Its primary improvement over other models is the use of data on roads to determine the locations

[28] See Review of Cost Studies, Methodologies, Pricing Policies, and Cost Based Rates for Interconnection and Unbundling of BellSouth Telecommunications, Inc.'s Services, Order, Docket No. 14631-U, released March 18, 2003 (GA PSC Order).
[29] Geocoding refers to the use of latitude and longitude to specify a location.

for loop plant. This is a good example where the ILEC was able to provide data on actual conditions that was superior to the information available from outside parties.[30] Where such data can be provided by the ILECs, I do not object to its use, so long as it is verifiable and available in a form that would allow other parties to use this data in their own models. I am, however, opposed to the Commission making any change to the rules that would put the ILECs in total control of cost modeling, by allowing the ILECs to present data on their actual network routing that was not subject to verification.

In its use of road locations, the BSTLM presents a stark contrast with the cost models from other ILECs, discussed above, that were allegedly based on the ILECs' "actual" networks. The models of the "actual" networks other than BSTLM used limited data from samples of loops that no other parties could verify. In contrast to those models, the BSTLM started with specific information on the location of ILEC central offices (as required by the Commission's TELRIC rules), customer locations, customer services, and the locations of roads, and used that topographical information to construct a network using those parameters. Use of these data allows the design of a network that serves the existing customers, taking account of the constraints regarding available rights of way for placing loop plant, using computational methods that are available and can be tested and confirmed by all interested parties. It does not rely on a spurious reality based on samples drawn by the ILECs, or on ILEC engineers' best guesses about loop characteristics. Instead, it properly starts with (1) verifiable starting and ending points for a

[30] In fact, based on a comparison of the loop plant output by the models filed in the UNE case in Florida, I believe that such a model will in general place less plant than models that do not reflect the road locations. *See* Florida PSC, Docket No. 990649-TP, Testimony of Brian Pitkin, Transcript 2187-2188.

network – the switches and the customer locations, (2) data on the potential routes a network can take – the location of the roads, and (3) data on the services purchased by customers at each location, and designs a network within those constraints that meets forward-looking engineering criteria.

In the Georgia proceeding, the BSTLM was used both to develop the amount of investment in the network and to develop the expenses of maintaining and operating that network. For determining both the investment and the expenses, the BSTLM used many inputs. The GA PSC had to make determinations of the appropriate values for each of these inputs, and determine whether those input values should more nearly reflect the ILECs' actual experience or the efficiencies achievable by an efficient competitor. The GA PSC was able to weigh the information provided by all parties and decide what information provided a more reliable basis for setting prices. To give just a few examples:

1. Labor time required for placing copper and fiber cable – Both BellSouth and the intervenors in the UNE case filed testimony on the number of hours required for this function. BellSouth's input for cable placement assumed that crews could place 100 feet of underground cable every 150 minutes and 100 feet of aerial cable every 75 minutes. The CLECs noted that this rate assumed that most time would be used in travel and set up, with very little time used in the actual placement. Presenting evidence on actual travel, set-up, and installation times,

the CLECs showed that a crew could place 3,000 feet of underground cable in an 8 hour day and 5,000 feet of aerial cable in the same time period.

2. Splicing for both copper and fiber cable – As initially filed by BellSouth, the BSTLM used BellSouth's estimate of the achievable number of splices per hour. Noting that these estimates did not even match BellSouth's own objective data, the GA PSC determined to input separate set-up and splicing time estimates. The GA PSC selected estimates of these times that more closely reflected BellSouth's own objective data on the amount of labor required to set up for and perform splices on both these kinds of cable. The GA PSC was able to make this modification to the BSTLM, because the model allowed for the user to change inputs. This is not true of many of the "actual" models presented by the ILECs.

3. Pole spacing and labor costs – The space between poles and the amount of contract labor used to place the poles fell between the values proposed by BellSouth and the intervenors. The GA PSC determined that the inputs proposed by BellSouth reflected its embedded pole placements and increased the distance between poles by about 10 percent to reflect a forward-looking network.

Selecting the appropriate inputs was in most cases hotly contested, and in my opinion the GA PSC did not always resolve those input issues correctly. My point is rather that TELRIC proceeding was very much grounded in the real world in which the network operates, and in real equipment and operations necessary to create that network. And when the GA PSC erred, it was not because its analysis was too "hypothetical," but because it failed in several respects to follow TELRIC's requirement that the network equipment it modeled was the most up-to-date and efficient equipment currently in use.

TELRIC Proceedings are not "Black Boxes"

The TELRIC proceedings held in the states do not result in a "black box" determination of rates in which parties are uncertain of the basis on which those rates have been set. To the contrary, the TELRIC proceedings in the states allow all interested parties substantial opportunity to analyze and assess the models and inputs used to set the UNE rates. In many of those proceedings, CLECs have introduced the HAI Model to present their estimate of the cost of UNEs.

The HAI model constructs a "bottom up" estimate of the UNE costs based upon detailed data describing demand quantities, network component prices, operational costs, network operations costs, and other factors affecting the costs of providing local service. The model's demand data, particularly data describing customer locations, line demand, and traffic volumes, serve as the key initial drivers. From these data, the model engineers and costs a local exchange network with sufficient capacity to meet total demand, and to maintain a high level of service quality. The model's inputs also include the prices of various network components, with their associated installation and placement costs, along with various capital cost parameters. These data are used to populate detailed input tables describing, for example, the cost per foot of various sizes of copper and fiber cable, cost per line of switching, cost of debt, and depreciation lives for each specific network component.

Using these data, the model calculates required network investments by detailed plant category. Next, the capital carrying cost of these investments is calculated. Operations expenses are then added to compute the total monthly cost of the unbundled network elements. Costs can then be displayed by study area, density zone,[31] wire center, Census Block Group ("CBG"), or customer cluster basis.[32]

The algorithms and sources for the data used in the HAI model are well documented and open to all for review and verification. The code for the model is written in widely known standard packages, such as Visual Basic and Excel. The openness of this model is widely acknowledged, and in fact was a substantial reason that several components of the HAI Model were incorporated into the Commission's Synthesis Model, which is used to set universal service support for non-rural carriers.

In addition to the openness of the model itself, the support for default input values used in the HAI model is available to all parties. The justification for each input value is provided in the documentation for the model. The inputs are based either on publicly available data – and in those cases the citations to those data are provided in the documentation – or if such data are not

[31] The HAI Model differentiates among density zones based on the number of subscriber access lines per square mile of service area.
[32] A CBG is a unit defined by the U.S. Bureau of the Census, and nominally comprises between 400 and 600 households. Customer clusters are dynamically formed aggregations ranging from singleton isolated customer locations, up to 1800 customer locations.

available, on the opinion of experts with extensive experience in the construction of networks. In the case of inputs whose support is expert opinion, the basis of those opinions is provided in the documentation.

The development of the HAI Model led BellSouth to develop the BSTLM, in an attempt to capture the effect of additional relevant variables, such as the location of the road network. When BellSouth used this model in the Georgia UNE proceeding, parties were able to provide extensive comment on the inputs used in that model. The GA PSC Order contains lengthy discussion of a large number of inputs, from the time required to set up and execute both copper and fiber cable splices, to the spacing and prices of poles, to the methodologies used to place underground cable, to structure sharing, to facility sharing for distribution and feeder cable, to the ratio of engineers and technicians used for placing equipment. For each of these inputs, all parties provided expert testimony, and the GA PSC made modifications, discussed above, to the inputs proposed by BellSouth where the record supported such changes. Although I may not agree with every decision made by the GA PSC as to the proper value for these inputs, it cannot be said that the process for arriving at those input values was not open and accessible to all.

TELRIC permits all parties to have equal access to information, and so the ability to provide comment on the models and inputs used to set UNE rates. The resulting rates cannot be said to come from a "black box." The Commission itself has run such proceedings in the Universal Service docket, and the Wireline Competition Bureau has done the same in a proceeding setting TELRIC rates in Virginia. In those proceedings, all parties were able to present models of UNE costs, propose inputs to be used in those models, and critique each other's submissions. In both these cases, whatever parties may say about the numerous decisions the Commission made about individual inputs, the resulting costs were the result of an open process.

Modifying the TELRIC Methodology Will Not Reduce the Length of UNE Proceedings

The Commission expresses concern that state proceedings to set UNE prices are too lengthy and consume excessive resources. It is undeniable that the proceedings can take a long time and require many resources by both the private sector and the states themselves. However, TELRIC was a new methodology for setting rates at the time that it was adopted by the Commission. A substantial part of the time required to set UNE rates has been absorbed in making initial determinations as to methodology and inputs. Once those initial determinations have been made, TELRIC proceedings can be expected to take less time.

Indeed, the Commission itself took many years to determine the rate of return rules that would be used to set interstate access rates after divestiture. The Commission had to develop (1) the Part 32 accounting rules, under which the ILECs recorded all their costs, (2) the Part 64 regulated/non-regulated rules, which removed the non-regulated costs from the Part 32 accounts, (3) the Part 36 separation rules, which allocated the resulting regulated costs between the state and interstate jurisdictions, (4) the Part 65 rules which specified how the rate of return for interstate rates was to be set, and (5) the Part 69 access charge rules, which specified how the interstate costs were to be apportioned among the interstate rate elements. Once those rules were set in lengthy docketed proceedings, the rates themselves were reviewed within 90 days. Similarly, now that the TELRIC methodology has been fleshed out in practice, implementing changes under that methodology should be less time consuming. In fact, if the Commission were to make substantial changes to the TELRIC methodology, this would result in more time and resources being consumed in setting TELRIC rates.

State-by-State Variation in UNE Prices

The Commission expresses concern that the state-to-state variation in UNE prices reflects unwarranted state-by-state variations in costs. The assumption appears to be that variations among states may reflect bad decision-making or insufficient expert guidance from the FCC on how to do the proper modeling. This is not the case.

It is unclear what state-by-state variation in costs the Commission is considering. If it is comparing differences between TELRIC and ILEC embedded costs among states, these differences may be due to different levels of efficiencies achieved by the different companies or any number of other factors. If instead, the Commission is making the comparison based on some other estimate of TELRIC costs, it is unclear why that alternative assessment of state specific TELRIC costs is more accurate than estimates that have been developed through state cost proceedings in which competing parties were able both to present their own evidence and to review other parties' evidence regarding those costs.

VII. Impact Of The Triennial Review Order

As the Commission has recognized in the NPRM, its decision in the *Triennial Review Order* "made a number of significant changes to the regime for determining what elements must be unbundled by an incumbent LEC." (¶42). In particular, the Commission ruled that the ILECs did not have to make available unbundled access to newly deployed fiber loops or to the packet-switching features, functions, and capabilities of their hybrid loops. The Commission also reaffirmed and extended its ruling that the ILECs do not need to unbundle access to packet switching, including DSLAMs and routers.

The Commission poses several specific questions on the relationship between its decision in the TRO and the TELRIC rules (NPRM ¶43). I believe that these questions, as well as others suggested by the TRO, follow from the FCC's decision to restrict the unbundling requirements to the "old" narrowband circuit switched network, at a point in time when the ILECs are making substantial investments to transition their network to a unified broadband network, based on packet switching. This has very significant consequences for the rules governing the costing and pricing of network elements.

I believe that there are compelling economic reasons for altering the goals of UNE pricing rules, to the extent that the "old" network is being phased out, and very few new investments are being made to handle the demand for use of these older facilities.
Under these circumstances, what price rules will give the right incentives for ILECs and CLECs to make the right decisions about investments and utilization of existing capacity? In

competitive industries, the rental price for obsolete assets in excess supply is the LRIC. Here, I am defining the long run as the period long enough for the firm to have the option to shut down entirely the operation of particular piece of equipment. However, unlike the scorched-node assumption of TELRIC, this application of LRIC costing treats the fixed investment cost of the equipment as sunk and so irrelevant to the UNE price. When there is an excess supply of this asset, the only component of LRIC will be the variable cost of maintaining and operating those assets. The reason for this is that the owners of the assets have an incentive to rent the asset at any price that exceeds its operating cost, rather than allow the asset to be idle. For example, Boeing 707 airplanes can still be leased (usually as cargo planes), even though the 1950s technology of this aircraft has been superseded by several generations of better aircraft. So long as there is some use for the old technology equipment, at a price that exceeds the variable cost of operation, it will be used, rather than scrapped, and the rental rate will be driven down to the level of these incremental operating costs.

If some additional investment in the old technology were needed to satisfy demand, then the cost of that additional capacity should be added to the operating costs in order to compute LRIC properly. For example, if there is demand for 51,000 switched lines at a wire center, and the existing local switch has the *capacity* to serve 75,000 lines, but there only 50,000 line cards installed in the switch, then the cost of the additional 1,000 line cards should be added to the operational and maintenance costs to yield the long run incremental cost for the 51,000 lines. Of course, the cost of the line cards should be based on their market price. Since the ILECs claim that CLECs can buy entire switches on eBay for a fraction of their original cost, the ILECs could presumably also find very low-priced spare line cards at the same source.

There can be no legitimate concern under these conditions that UNE rates will be set too low to send the appropriate investment signals. ILEC investment in the new network will not be artificially repressed by LRIC-based pricing of the old network, because the UNE pricing rules that apply to the old network will not apply to the new functional capabilities of the new network. Also, contrary to what the ILECs may claim, reducing the prices of the old network's UNEs will not deter investment in the new network. According to public statements made by some of the ILECs, investment in the new network is justified entirely by the cost-savings in maintenance and operations.[33] Moreover, even if putting the old network "on sale" were to decrease demand for the new network, and slow down its deployment, the outcome would be economically efficient. It makes no sense to invest in new equipment if the old equipment is still useable and preferred by customers at a price that reflects it low opportunity cost.

The UNE pricing rules governing the old network also need not be targeted at encouraging the CLECs to build rather than buy. As long as there is sufficient capacity in the old network to handle all present and future demand, it would be wasteful and inefficient for the CLECs to replicate the ILECs' network and invest in exactly the same type of equipment, even if they could use that equipment more efficiently than the ILECs. Therefore, there is no danger of

[33] For example, in its press release announcing Project Pronto, SBC said that it expected expense and capital savings alone to offset the entire cost of the initiative. See the press release dated 10/18/99, available at http://www.sec.gov/Archives/edgar/data/732717/0000732717-99-000051-index.html

setting old network-UNE prices too low, so long as total demand can be accommodated on the existing capacity.

Application of pricing principles to specific network elements

In many situations the CLECs will continue to depend upon the ILECs' circuit switches and home-run copper loops, at least in the foreseeable future. If, as the ILECs' data indicate, the demand for circuit switching is falling and as result the ILECs have excess capacity, it would be foolhardy to encourage or require the CLECs to build their own switches, and create still more unused capacity on the ILEC switches. Therefore, UNE switching prices should be set at their LRIC. In other words, if there is an excess supply of switching, the price should be equal to the total operating and maintenance costs of the switch calculated on a per line basis.

Since the CLECs will be denied access to the ILECs' broadband network, they must rely on home-run copper loops to gain last-mile access to their customers. As the ILECs increase investment in fiber loop facilities (either to the remote terminal or to the curb), there should be more spare copper plant available for lease by the CLECs. The copper plant is already in the ground and has no other use, or opportunity cost, except as scrap metal. Therefore, these copper loops too should be made available to the CLECs at their long run incremental cost, which includes only the continuing incremental cost of operating and maintaining this plant. In the event, however, that the LRIC of the old network elements is higher than the TELRIC prices that prevailed when the CLECs and ILECs both used the same network, then the price should not increase. It would be unfair for the Commission to impose a heavy burden of high costs on competitors as a result of its own decision to deny the CLECs access to the capabilities of the new network.

VIII. Presumed Efficiency of ILEC Operations Under Price Caps

Finally, the Commission requests comment on the whether the ILECs' operations and costs should be presumed efficient based on the incentives for efficiency said to flow from price cap regulation. Under this presumption, ILECs' actual operations would be presumed to be the operations of an efficient carrier and therefore could be used as the basis for UNE pricing. The Commission should not make this presumption.

First, while the federal jurisdiction has a price cap plan, that plan covers only about 25 percent of the ILECs' costs. While many states also have price cap plans, not all do, and even those that do have differing amounts of rate of return protections built into their plans. To the extent that the state price cap plans can be adjusted if the ILECs achieve sufficiently large productivity improvements – either through after-the-fact adjustments to the productivity factor or through explicit adjustments to the price cap for excessive earnings – the ILECs' incentives to be efficient are reduced.

Second, price cap plans do not guarantee efficiency. It is entirely possible that the ILECs have made inefficient investment decisions irrespective of whether their behavior was similar to firms in competitive markets and their goal was to be as efficient as possible. For example, the ILECs could have overestimated the demand for second lines and placed too much capacity in their loop plant. To the extent the ILECs have made poor investment decisions, the actual post-price cap embedded costs would be greater than TELRIC. Basing UNE prices on these embedded costs would penalize customers for the ILECs' bad decisions. It would be comparable, for example, to forcing the long distance industry's customers to pay for their current excess capacity, which was created well after the time when the long distance market became highly competitive.

Finally, no matter how strong the efficiency incentives under a price cap regulatory scheme are, the incentives under real competition will be greater. Regulators cannot make the same tough decisions to discipline the behavior of a company that the market can. As an example, the Commission need look no further than its own price cap plan, which still retains a low-end adjustment which protects a carrier from earnings that are so low as to hinder its ability to attract capital. What competitive firm has any such guarantee?

There are also practical objections to this proposal. First, given the different state price cap plans, the Commission could not make a nationwide presumption of ILEC efficiency. Each state price cap plan would have to be assessed to determine whether its incentives were sufficiently strong to justify the presumption. In addition, even if the incentives to efficiency were strong, they might not reach to every aspect of the ILECs' operations. The Commission would need to carefully consider what specific aspects of the ILECs' operations were to be presumed efficient, rather than giving a blanket blessing to every aspect.

Declaration

I declare under penalty of perjury that the foregoing is true and correct.

Executed on December 16, 2003.

Michael D. Pelcovits